FAIRCHILD MODEL T79xx SERIES ELECTRO-PNEUMATIC TRANSDUCER with DeviceNet™Communication (Basic) Operation and Maintenance Instructions Software Version 3.45 and 3.46
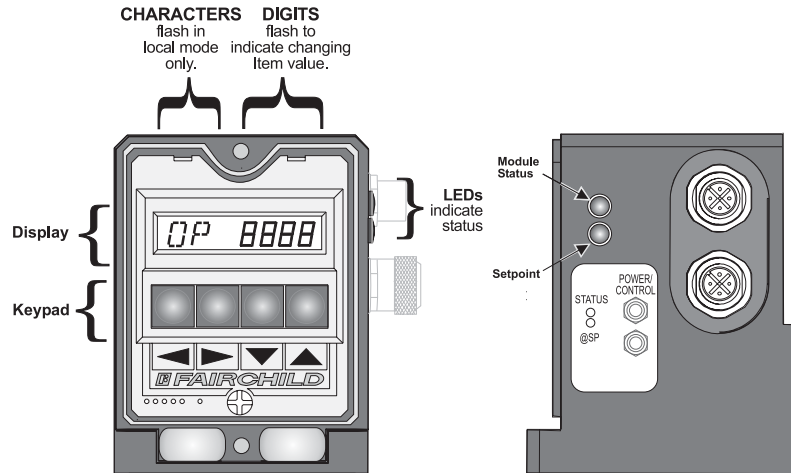
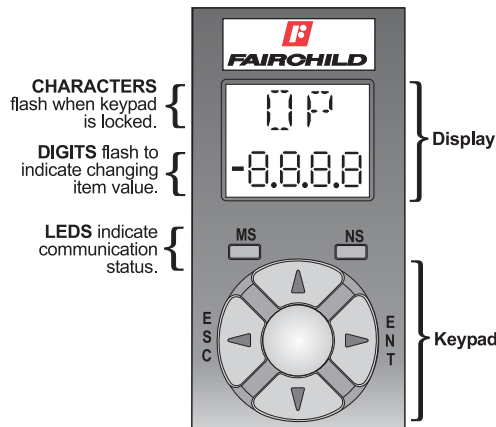**Figure 1.** Model T7900 Keypad

Figure 2. Model T7950 Keypad

Figure 3. Model T79xx Series Transducer Keypad Functions

	Main menu/Sub-menu items (digits not blinking)	Item value - (digits blinking)
▲	Go to previous menu item.	Go to previous item value.
▼	Go to next menu item.	Go to next item value.
►	Go to Sub-menu. Select item value to change, starts blinking.	Accepts new value. (ENTER) Stops blinking.
◄	Go to OP .	Does not accept new value.(ESC) Stops blinking.

GENERAL INFORMATION

The Model T79xxD with DeviceNet communication capabilities is an electo-pneumatic transducer with digital electronic communication used to control air pressure. The basic function of the Model T79xxD is similar to that of a traditional electro-pneumatic transducer with increased functionality through the use of DeviceNet digital communication, the keypad, and display. The Model T79xxD uses feed and bleed solenoid valve control technology, digital feedback electronic control, and an internal electronic pressure sensor to achieve high accuracy pressure control. Flexible configuration and PID tuning capability ensure that this pressure controller can meet the most demanding air pressure control applications.

DeviceNet is a digital network that connects industrial devices and systems. The DeviceNet protocol standard is managed by the Open DeviceNet Vendor's Association (ODVA).

For detailed information about the DeviceNet standard including wiring, Control Software, and other DeviceNet products, see the ODVA web site at www.odva.org .

Electronic Data Sheets (EDS) are available for the Model T79xxD. An EDS is a standardized electronic file format that contains the configurable parameters for a device and the public interfaces to those parameters. Network tools use EDS files to read and set device parameters in a user-friendly format that eliminates the need to revise the configuration information in addressed numerical code. You can download Model T79xxD EDS files from the Fairchild web site at www.fairchildproducts.com .

SPECIFICATIONS

Model T7900

Electrical
Supply voltage . . . . 11-24 VDC
Power consumption. . . . . .Less than 4 watts
Analog input . . . . . Current mode input range 0-24 mA 35 mA maximum without damage
Voltage mode input range 0-12 VDC
Voltage mode input clamped at 13 VDC

Pneumatic
Maximum Supply pressure: . . . . 200 psig
Minimum Supply Pressure. . . . . No less than 5 psig above maximum output

Forward Flow Capacity. . . . . Up to 100 SCFM @ 170 psig

Exhaust Flow Capacity . . . . .Up to 50 SCFM

Air Quality . . . . Instrument Air per ISA S7.0.01 Recommended

Input signal / Impedance: . . . 4-20 mA / 246 ohms, 0-10 VDC / 500k ohms

Model T7950

Electrical
Supply voltage . . . . 11-24 VDC
Power consumption . . . . Less than 4 watts
Analog input . . . . . Current mode input range 0-24 mA
35 mA maximum without damage
Voltage mode input range 0-12 VDC
Voltage mode input clamped at 13 VDC

Pneumatic
Maximum Supply Pressure . . . . 150 psig
. No less than 5 psig
Minimum Supply Pressure . . . above maximum output
Forward Flow Capacity . . . . .11 SCFM @ 150 psig supply at midscale output
Exhaust Flow Capacity . . . . 2.0 SCFM @ 15 psig output pressure
Air Quality . . . . Instrument Air per ISA S7.0.01 Recommended

Environmental - T7900 AND T7950
Operating Temperature . . . . Range 0 –160ºF
Temperature Effect . . . . $\pm$(0.5%+0.06%/ºF) of span

Main Menu *(shown in red)*

Table 1. Main Menu

Item	Description	Range
OP	**Output Pressure -** Displays the actual output pressure.	0-30 psig, [0-2 BAR], (0-200 kPa) 0-60 psig, [0-5 BAR], (0-500 kPa) 0-120 psig, [0-10 BAR], (0-1000 kPa)
SP	**Setpoint -** Sets/displays the required output pressure.	0-30 psig, [0-2 BAR], (0-200 kPa) 0-60 psig, [0-5 BAR], (0-500 kPa) 0-120 psig, [0-10 BAR], (0-1000 kPa)
S	**Setup Menu -** Accesses the Setup Menu.	See Table 2.
C	**Calibration Menu -** Accesses the Calibration Menu.	See Table 3.
T	**Tuning Menu -** Accesses the Tuning Menu.	See Table 4.

Sub-menus *(shown in blue)*

Table 2. *Setup Menu (Option S on the Main Menu)*

Item	Description	Range
EN	**Look Ahead Function -** [2] Improves setpoint accuracy and response time.	Enable or Disable
ID	**MAC ID -** Sets/displays the DeviceNet address.	0-63
BR	**Baud Rate -** Sets/displays the communication speed.	125K, 250K, 500K
N/	**Numerator -** Sets/displays pressure unit conversion factor.	0-9999
/D	**Denominator -** Sets/displays pressure unit conversion factor.	0-9999
DL	**DeviceNet Lockout -** Sets/displays DeviceNet communication lockout status.	Lock or Unlock
KL	**Keypad Lockout -** Displays keypad lockout status.	Lock or Unlock

Table 3. Calibration Menu *(Option C on the Main Menu)*

Item	Description	Range
L1	**Location 1 -** [1] Records the low pressure look ahead coefficient.	N/A
L2	**Location 2 -** [1] Records the high pressure look ahead coefficient.	N/A

Table 4. Tuning Menu *(Option T on the Main Menu)*

Item	Description	Range
KP	**Proportional -** Sets/displays the proportional gain.	0 - 63.99
KI	**Integral -** Sets/displays the reset time.	0 - 9.99 repeats per second
KD	**Derivative** - Sets/displays the rate of change.	0 - 6.399 seconds
DB	**Deadband** - Sets/displays the amount of pressure centered on the setpoint to which the unit does not respond.	0 - 10% maximum pressure (Value displayed in pressure units)

[1] Recommend 60% difference in the range (value) between L1 and L2 . A **zero** value is **not** recommended.

[2] L1 and L2 **must** be set for EN to work correctly.

Color Key

Main menu item	(pink)
Sub-menu item	(blue)
Item value	(gray)

Item Value Function Key

▲ or ▼	Increase / Decrease
► or ◄	Accept / Reject

Only when ☼ DL = LOC.

OP 7.48

SP 8.8.8.8 — **SP** 8.04

S — EO / ID / BR / N/ / /D / DL / KL

EO 8.8.8.8 — EO EnAb / EO dlS

ID 8.8.8.8 — ID 10

BR 8.8.8.8 — BR 125 / BR 250 / BR 500

N/ 8.8.8.8 — N/ 1

/D 8.8.8.8 — /D 1

DL 8.8.8.8 — DL ULOC / DL LOC

KL 8.8.8.8 — KL ULOC / KL LOC

C — L1 / L2

► to execute

T — KP / KI / KD / DB

KP 8.8.8.8 — KP 5.98

KI 8.8.8.8 — KI 0.10

KD 8.8.8.8 — KD 0.000

DB 8.8.8.8 — DB 2.51

NOTES:

Characters flash ☼ when DL = LOC.

Digits flash ☼ to indicate changing item value.

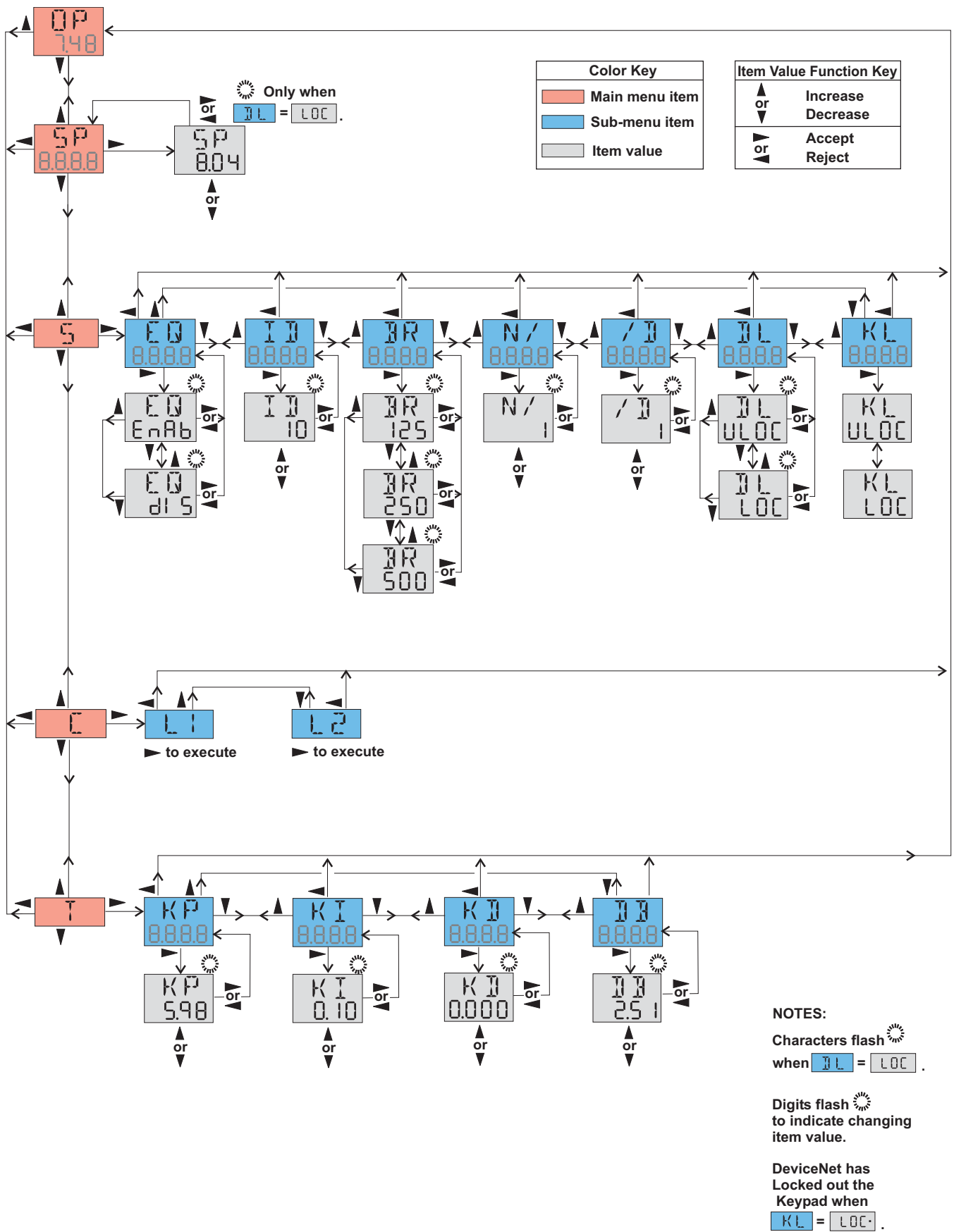DeviceNet has Locked out the Keypad when KL = LOC.

Figure 2. Model T79xx Series Menu System

MENU ITEM FUNCTIONS

Main menu items are shown in red. Sub-menu items are shown in blue. For more information about menu items, see Figure 2 on page 3.

Setpoint (`S`)

DeviceNet normally controls the setpoint through the I/O Message or Explicit Message commands. To change the setpoint locally, use the `S` menu function on the keypad.

NOTE: **If DeviceNet I/O messaging is active, it will overwrite the setpoint value that you entered on the keypad at the next message cycle. To prevent the overwrite, enable the DeviceNet Lockout function in the Setup `S` menu or deactivate DeviceNet Explicit and I/O Messaging.**

Look Ahead Function (`EN`)

Using the Look Ahead `EN` function can reduce the gain error and enhance the Model T79xxD response characteristics in most linear control applications. With less gain error, you can reduce the PID tuning coefficients to improve the response characteristics without sacrificing accuracy or response time. To improve response characteristics, the Look Ahead `EN` function predicts the required internal control correction for a specific setpoint based on the characterizing values `L1` and `L2`. To achieve optimum look ahead characteristics, the Calibration `C` menu items `L1` and `L2` must be set with the Model T79xxD operating with the supply pressure it will use in its application.

MAC ID (`ID`) and Baud Rate (`BR`)

The Model T79xxD transducer ships from the factory with the MAC ID `ID` set to 63 and the Baud Rate `BR` set to 125K. Before you put the DeviceNet system on line, access the Setup `S` menu, set the MAC ID `ID` to the required value and the Baud Rate `BR` to match the Baud Rate of the system.

NOTE: **You must cycle the power to the Model T7950D to activate the new MAC ID `ID` and Baud Rate `BR` values. A DeviceNet issued Reset command also activates the new values.**

Pressure Unit Conversion (`N/`) and (`/D`)

The Model T79xxD Output Pressure `OP` can display in any required unit. To convert to other pressure units, set the values of menu items Numerator `N/` and Denominator `/D`. Values entered in `N/` and `/D` form a fractional conversion factor that converts the base units of pressure (psig) in the Model T79xxD into the required units. The Output Pressure `OP` (new pressure unit) is determined by the expression $OP = (pressure\ in\ psig) \times (N/D)$. Consult a conversion table to obtain a conversion factor for the required units, convert it into a fractional form, and enter it into the Model T79xxD using `N/` and `/D`. The values of `N/` and `/D` are limited to the range of 1 to 9999 and must contain integers only. The Model T79xxD ships from the factory with units of psig, BAR, or kPa, determined by the part number. The Model T79xxD automatically determines the Output Pressure `OP` decimal point location based on the maximum Output Pressure `OP` after the N/D conversion.

NOTE: **The Setpoint `S` and Deadband `DB` item values display in terms of the pressure units defined by the `N/` and `/D` conversion factor.**

For more information about `N/` and `/D` values for common pressure units, see Table 5.

Table 5. Pressure Unit Values

Unit	N/	/D	Comments
psig	1	1	psig = psig x 1
BAR	100	1451	BAR = psig x 0.0689
kPa	6895	1000	kPa = psig x 6.895
InHg	5000	2456	InHg = psig x 2.036

DeviceNet Lockout (`DL`) and Keypad Lockout (`KL`)

You can access all menu items in the menu structure through DeviceNet using the Explicit Message channel, with the exception of the DeviceNet Lockout `DL` function in the Setup `S` menu. If you require exclusive local control, enable the DeviceNet Lockout `DL` function to prevent the DeviceNet host from making changes to values you entered with the keypad. DeviceNet retains query capability with DeviceNet Lockout `DL` enabled.

You can activate and deactivate the Keypad Lockout `KL` function only through the DevicNet communication channel. When activated, the `KL` function lets the host prevent changes from the keypad to the Model T79xxD operating configuration. When you access the `KL` menu item from the keypad, only the status of the function displays.

Calibration Menu Items (L1) and (L2)

To improve response characteristics, the Look Ahead EN function predicts the required internal control correction for a specific setpoint based on the characterizing values L1 and L2. To achieve optimum look-ahead characteristics, you must set the Calibration menu items L1 and L2 with the Model T79xxD operating with the supply pressure it will use in its application. To set L1 and L2, use the following steps:

1. Set the Deadband DB, on the Tuning menu, to zero.

2. Set the Setpoint SP to a value between 10 and 20% of the maximum operating range.

3. Access the Calibration menu. Scroll through the menu until L1 displays. Press the enter key to select L1. When L1 flashes on the display, the new value is set.

4. Repeat the procedure for L2 with the setpoint between 70 and 100% of the operating range.

Tuning Coefficients

The Model T79xxD ships from the factory with nominal PID values. For optimum performance, you should optimize the PID coefficients KP, KI, and KD on the Tuning menu. There are several PID optimization routines you can use to adjust the PID coefficients. The following is a basic procedure that works in most applications:

1. Start with KP=1.00, KI=0, and KD=0. DB should be set to zero when optimizing PID. You can return DB to the required value after optimizing PID.

2. Increment KP by 0.01 or other minimal value.

3. Change the Setpoint SP from 50% full-scale to 70% full-scale. Change the setpoint back to 50%.

4. If the output stabilizes, go back to 2.

5. If the output does not stabilize, measure the period (in seconds) of the oscillations and go to step 6. If the output stabilizes, go back to 2.

6. Set KP to 50% of the final unstable value previously identified. Set KI to the period of the oscillations in seconds. *Set KD=KI/8.*

Deadband (DB)

Deadband DB is the set amount of pressure error, centered about the setpoint, that the unit will not take action to correct. To achieve fine control, you can set the Deadband DB to zero however, this causes the control solenoid valves to operate continuously reducing their life span and consuming air.

Restoring Original Factory Calibration

To restore the factory item values, use the following steps:

1. Go to T .

2. Press and hold ▲ until C appears.

3. While holding ▲, press and hold ◄ until the display flashes.

Messages

At startup, message symbols can briefly appear on the display. For an explanation of these message symbols, see Table 6.

Table 6. Messages

Message	Problem	Solution
14, 15	Memory is corrupted.	Return the unit to the factory.

MAINTENANCE

The Model T79xxD uses a supply filter to prevent detrimental particles from entering the pilot section of the unit. Clean or replace the supply filter as necessary to ensure maximum performance. For additional maintenance and troubleshooting information, see Tables 7 and 8.

Table 7. Troubleshooting

Problem	Solution
No Output	• Check the supply filter. • Check the supply pressure. • Check the inlet screen in the booster. • Check the power supply. • Check for an existing Input Signal.
Leakage	• Check for loose fittings. • Check for loose body screws.
Improper Output	• Check for output pressure leakage.
Erratic Operation	• Check for liquid in the air supply. • Check for loose wires or connections. • Check for improper tuning. • Check proper settings for L1 and L2
Constant Maximum Output	• The external pressure is not applied to "P" port. ("P" option only).
Unable to change settings	• Check the Keypad Lockout status.

Table 8. LED Status

LED Status	Module Status (MS)
Off	No power - The device does not have power.
Green	Device operational - The device is operating in a normal condition.
Red	Unrecoverable fault - A RAM or ROM error occured. Return the unit to the factory.

LED Status	Network Status (NS)
Off	The device does not have power or is not on line. Check the Module Status LED.
Flashing Green	The device is on line but does not have DeviceNet communication in the established state.
Green	The device is on line and has DeviceNet communication in the established state.
Flashing Red	The I/O connection is in the timed-out state.
Red	The device detected an error and cannot communicate on the network.

NOTES:

1. If troubleshooting does not correct the problem, return the transducer to the factory for repair.

2. To replace all elastomers and the supply filter in the Model T7950, install Service Kit 19715-2.

3. To replace the solenoid valves in the Model T7950, install Service Kit 19715-1.

4. For the Model T7900, install Service Kit 19375-1.

5. To replace solenoid valves in the Model T7900, order quantity (2) of Part Number: 290-IPI-001-2.

LEGAL NOTICE:

The information set forth in the foregoing Installation, Operation and Maintenance Instructions shall not be modified or amended in any respect without prior written consent of Fairchild Industrial Products Company. In addition, the information set forth herein shall be furnished with each product sold incorporating Fairchild's unit as a component thereof.

FAIRCHILD
precision pneumatic & motion control